Process Gas and Emission Monitoring For Chemical and Refining Industries

NO2 SO2 CO O2 H2O NO NH3 N2O HCl HF CO2

EcoChem Analytics

www.ecochem.biz

Tailored Gas Monitoring Solution for Chemical and Refining Industries

Single MC3 analyzer measures gases including SO_2 , NO , NO_2 , N_2O , CO, HCl, NH_3 , HF , CO_2 , H_2O & O_2

Concerned about future Climate Change regulations & emission credit trading? The MC3-1 can effectively measure key Greenhouse gases including CO_2 , HF and N_2O.

- ✓ Direct measurement (without converters) of up to 8 components
- ✓ Low maintenance system ideal for conditions encountered in the industrial facilities
- ✓ Sample system is optimized for your application - fully extractive “hot-wet”, “cold-dry” or even dual
- ✓ Powerful software allows for remote diagnostics and trouble-shooting
- ✓ Cost-effective system, especially if more than three gases have to be measured
- ✓ Process Control and Regulatory applications - complies with state and Federal regulations (40 CFR Part 60 and 75)
- ✓ Two decades of design and application experience with installations including chemical and refining facilities, power plants, waste-to-energy, pharmaceutical manufacture, cement kilns and hazardous waste incineration plants.

Depending upon your needs, EcoChem can deliver...

Multicomponent MC3 analyzer

Field-mount version

Standalone system cabinet with MC3 analyzer, PLC and sample system components

Turnkey project incorporating a building enclosure with system cabinets

EcoChem Analytics ✦ 202 Reynolds, League City, TX 77573, USA ✦ 281-338-9888 ✦ www.ecochem.biz ✦ info@ecochem.biz

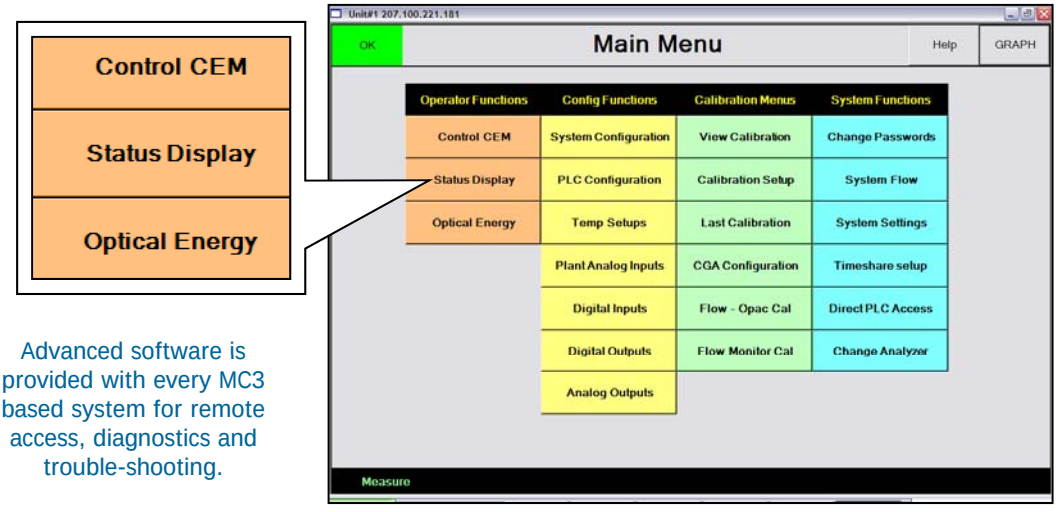
Technical Specifications -- MC3-1 Analyzer

The MC3 analyzer is based on infra-red technology. In addition to the standard measurements listed in the table on the right, contact EcoChem for other components and measurement ranges

Gas	Typical Low Range*	Typical High Range *
SO2	0-10 PPM	0-1,000 PPM
NO	0-5 PPM	0-500 PPM
NO_2	0-5 PPM	0-500 PPM
N_2O	0-10 PPM	0-1,500 PPM
CO	0- 5 PPM	0-5,000 PPM
HCl	0-10 PPM	0-100 PPM
NH_3	0-5 PPM	0-100 PPM
HF	0-10 PPM	0-1,000 PPM
CO_2	0-2%	0-20%
H_2O	0-2%	0-25%
O_2	0-10 %	0-25%

* Typical range for application -- user can select appropriate range; dual ranges possible

Weight	(35 kg) - analyzer only
Dimensions	Standard 19in rack mount
(W x H x D)	19 in x 8.75 in x 23 in (48 cm x 22 cm x 58 cm)
Flow Rate	2-7 liter per minute with ¼" Swagelok connectors
Display	Menu-driven LCD Panel can be field-customized
Power	115 volts AC / 60 Hz or 220 volts AC / 50 Hz
Accuracy	± 2 % of full-scale value
Lower Threshold	1 % of lowest range
Response Time	10 seconds
Output Signals	Analog: 8 signals of 0/4 – 20 mA; Digital: 2 ports RS 232-C, 1 port RS 422-A; Relays: Failure Indicator, Service and Maintenance
Operating Temperature	32 – 105°F (0 – 40°C)



Advanced software is provided with every MC3 based system for remote access, diagnostics and trouble-shooting.

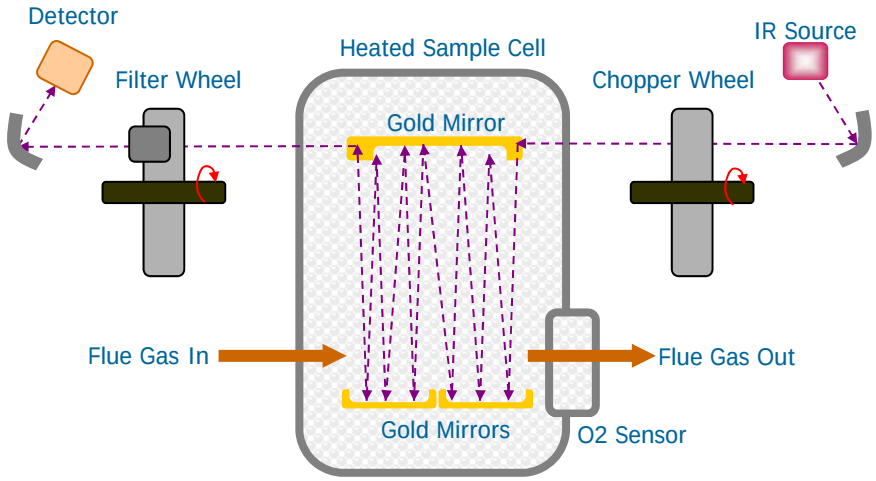
Primer on EcoChem Multicomponent Gas Analyzer Technology

What is the MC3 Analyzer?

The MC3 is a gas analyzer manufactured by EcoChem that is used for simultaneously measuring concentrations of gases including but not limited to SO2, NO, NO2, N2O, CO, HCl, NH3, CH4, CO2, H2O and O2. A single MC3 analyzer can measure up to 8 components simultaneously.

How does the MC3 Analyzer work?

Using state-of-the-art infrared detection technology, the MC3 measures concentrations on a real-time basis. Each component in the gas mixture is measured directly with a long path heated sample cell along with gas-filled cells and interference filters with a single optical bench. Subsequently, software algorithms eliminate cross-interference between the components. Oxygen is measured using a fully integrated Zirconium Oxide sensor.

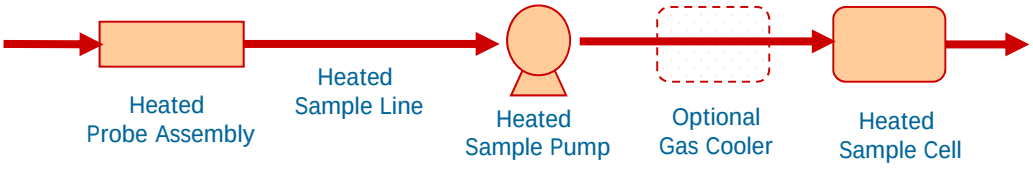


What about the Sampling System?

EcoChem will work with you to select the appropriate sampling system for your application

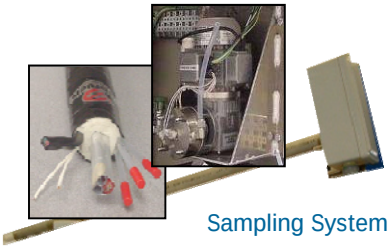
Hot-Wet Sampling: All components (probe, sample line, pump and analyzer sample cell) in contact with the gas stream are maintained above the dew point of the flue gas to prevent condensation of reactive vapors. This approach does not incorporate a gas cooler. The Hot-Wet sampling approach results in a simple and reliable sampling system with high availability.

Cold-Dry Sampling: For special applications where a) reactive gases such as NH3 and HCl are not monitored and/or b) low levels of NOx are involved, the sample system may include a gas cooler to remove water from the flue gas stream.



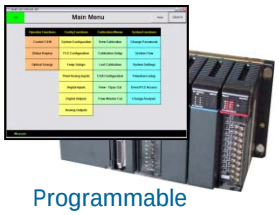
EcoChem Experience...
Bringing It All Together Successfully

Multicomponent Gas Analyzer - MC3



Sampling System

Other measurements
Opacity & Flow



Programmable Logic Controller

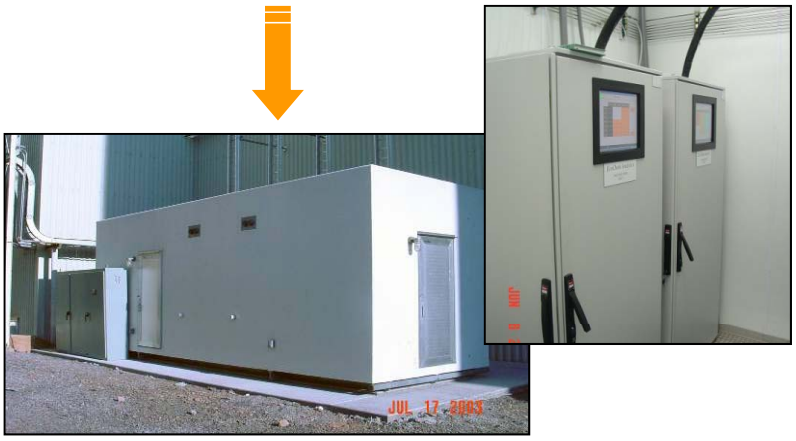
Data Acquisition System

Building Enclosure

Project Management and Regulatory Assistance

Service and Remote Support

Contact EcoChem to discuss your needs and obtain a detailed site-specific cost proposal. Thank you!



Successful CEMS Installation

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Recent Installations Using EcoChem Third Generation Multicomponent Technology

Urea and Nitric Acid Manufacture… PCS, Lima, OH
EcoChem supplied a MC3 based multicomponent CEMS to a urea, ammonia, nitrogen solutions and nitric acid manufacturing facility. The MC3 analyzer measures NO, NO2, N2O, NH3 and H2O. Quick turnaround project (45 days) that was installed and certified in July 2007.

Ammonia, Nitric Acid… Rentech Energy Midwest, East Dubuque, IL - The MC3 based CEMS measures NO, NO2, N2O, NH3 and H2O. Quick turnaround project (45 days) that was installed in December 2007. A second similar CEMS will be installed in 3rd quarter 2008.

Urea and Nitric Acid Manufacture… PCS, Geismar, LA
EcoChem supplied two MC3 based multicomponent CEMS to a urea, ammonia, nitrogen solutions and nitric acid manufacturing facility. The MC3 analyzer measures NO, NO2, N2O, NH3 and H2O.

Contact EcoChem to visit our installations with certified CEMs

Urea and Nitric Acid Manufacture… CF Industries, Donaldsonville, LA
EcoChem supplied nine MC3 based multicomponent analyzers for this urea, ammonia, nitrogen solutions and nitric acid manufacturing facility. The MC3 analyzer measures NO, NO2, N2O, NH3 and H2O.

Other chemical and refining industries installations include Agrifos, Pasadena, TX, Alon, LA and Albemarle, La Porte, TX

Constellation Energy, Panther Creek Energy Facility, Nesquehoning, PA – 80 MW power plant burning anthracite coal-mining refuse. Two EcoChem MC3 systems measuring NOx, SO2, CO, CO2 and O2 first certified in March 2005 for US EPA Part 60/75 and Pennsylvania (PADEP) regulations.

Covanta Energy, Quezon, Philippines
440 MW sub-bituminous pulverized coal-fired boiler has selected the reliability of the MC3 for their new CEMs upgrade at this remote Philippines plant. Delivery and certification to EPA specifications is scheduled for 3rd Quarter 2007.

Constellation Energy, Sunnyside Cogeneration Facility, Sunnyside, UT -- 58 MW power plant burning waste coal. One EcoChem MC3 measuring NOx, SO2, CO2 and O2 first certified in May 2005 for US EPA Part 60 and state regulations.

Recent Installations Using EcoChem Third Generation Multicomponent Technology

Wheelabrator Lisbon Inc., Lisbon, CT

500 tpd Waste-to-Energy facility located in Lisbon, Connecticut. Two MC3 based CEMS at the outlet of pollution control devices measuring NOx, SO2, CO and O2. Certification testing in April 2008.

Wheelabrator Falls Inc., Morrisville, PA

1600 tpd Waste-to-Energy facility located in Bucks County, Pennyslvania. Four MC3 based CEMS at the inlet & outlet of pollution control devices measuring NOx, SO2, CO, HCl, and O2. First certified in September 2003. Turnkey DAS, prefabricated building, support services, full remote diagnostics. EcoChem staff maintains 31 CEMS at 8 different Wheelabrator facilities nationwide.

Lilly Tippecanoe Laboratories, Eli Lilly, Lafayette, IN

Pharmaceutical facility where MC3 based CEMS assist the customer comply with Pharma MACT, Hazardous Waste MACT and Indiana state regulations. Two CEMS measure the flue gas from Regenerative Thermal Oxidizers (NOx, CO, SO2, HCl, O2 and THC). These systems were certified in 2002. One CEMS measuring was installed for a hazardous waste incinerator and certified in 2003. A fourth MC3 based CEMS is installed on another hazardous waste incinerator and was certified in October 2004. Two more MC3 based CEMS monitoring boiler emissions were supplied first quarter 2007.

Coal and Natural Gas Power Generation

A major mid-west Power Utility placed an order for 21 MC3 analyzers. The company had evaluated other multicomponent analyzers and has now standardized on the EcoChem MC3 for both their coal-fired plants and their gas-fired facilities - over 2100 MWs of coal-fired power generation. Delivery of the first systems started in 1st Quarter 2007.

Wasatch Integrated Waste Management District, Layton, UT

Waste-to-Energy facility located in Davis County, Utah operating a municipal landfill and two 210 ton per day municipal waste combustors. Two MC3 based CEMS measuring NOx, SO2, CO and O2 . HCl and H2O are also measured for process optimization. The systems interface to a plant DAS implemented on a PI / Intellution platform satisfying Title V / Part 60 regulatory requirements. System installed and certified in August 2005.

Broad Mountain Partners, Gilberton Power, Frackville, PA – 80 MW cogeneration plant burning anthracite coal-mining refuse. One EcoChem MC3 measuring NOx, SO2, CO, CO2 and O2 first certified in April 2004 for US EPA Part 60/75 and Pennsylvania (PADEP) regulations.

These pages illustrate typical facilities with multicomponent CEMS. Please contact EcoChem for a detailed listing of installations.

Top Ten Reasons to Work with EcoChem

1. **Lowest Routine Maintenance** system on the market

2. **Central Location and Regional Service**– Strategically located in Houston, TX – within hours of a large segment of US chemical and refining industry. Rapid response and regular quarterly or semi-annual service contracts

3. **Dedicated to Customer Service** – 65% of EcoChem's business is repeat business from long-standing customers. Prompt attention to all inquiries – quick proposal turnaround and option for expedited system delivery

4. **Understanding of Application** – We have installations at chemical facilities and we build each system specific to your process. Our regulatory systems satisfy both state and federal regulations

5. **Certified Installation Client List –** Chemical facilities (PCS Lima, PCS Geismar, CF Industries, Rentech Midwest, Agrifos, Albemarle) and installations throughout US and international locations

6. **Robust Operator Interface with Remote Diagnostics Software** – solid PLC control, color graphics touchscreen and remote trouble-shooting capability result in quick resolution of issues

7. **Multicomponent Analyzer** – the MC3 is a smart blend of advanced technology and durability. 8 components from one analyzer and moisture measurement is included.

8. **Comprehensive Documentation** – Detailed drawings, operations manuals and training guides

9. **Ability to Offer Broad Scope** - analyzer only, all the way to turn-key system with Data Acquisition System as well as assistance with state and federal regulatory requirements

10. **In-built Capability to Address Future Needs** – measure CO2, CH4 and N2O which may be required by Greenhouse Gas regulations. Measure the NH3 slip for the SCR process at your facility. Enhance the standard system at minimal cost.

Clear Choice …

Single MC3 multicomponent analyzer or heaps of discrete analyzers from different vendors